

# Appendix I

## Alternative Component Options

This appendix includes standard and guideline options used in developing the FEIS alternatives, as discussed in Chapter 2 and listed by alternative in Table 2-3, that were not adopted for the final Forest Plan (Alternative 11). Component options are included in four categories:

- ♦ Beach and Estuary Fringe
- ♦ Riparian Habitat (Options 1, 2 and 3)
- ♦ Deer Winter Range
- ♦ Karst and Caves

The first three component options are from the 1996 Revised Supplement; the fourth is from the unpublished 1992 version of the Proposed Forest Plan.

In the Revised Supplement, different alternatives were assigned options within the standards and guidelines included here. That text has not been revised. Alternative 8 is no longer being considered in detail. Alternative 10, which was the Preferred Alternative for the Revised Supplement, was not included in the standards and guidelines. In the following, Alternative 10 is comparable to Alternative 8 for the Riparian and Deer options, and to Alternative 2 for the Beach and Estuary options.

# BEACH AND ESTUARY FRINGE

## Forest-wide Standards & Guidelines

### Beach & Estuarine Description: BEACH1

#### I. Objectives and Identification

##### A. Management objectives of the beach and estuary fringe habitat:

1. To maintain the ecological integrity of beach and estuary fringe forested habitat to provide sustained natural habitat conditions and requirements for wildlife, fish, recreation, cultural, visual and other resources.
2. To provide a relatively continuous forested corridor linking terrestrial landscapes within islands.
3. To provide a variety of recreation opportunities, normally of a primitive or semi-primitive nature and retain the visual quality
4. To maintain an approximate 500-foot wide primary beach fringe and an additional approximate 500-foot wide extended beach fringe of old-growth forest to provide important habitats for eagles, deer, marten, otter, bear and other wildlife species strongly associated with this maritime influenced habitat. Old growth conifer forests are managed in near-natural undisturbed habitat conditions.
5. To maintain an approximate 1000-foot wide estuary fringe of old growth forest that contributes to maintenance of the ecological integrity of the biologically rich tidal and intertidal estuary zone. Habitats for shorebirds, waterfowl, bald eagles, and other marine-associated species are emphasized. Old-growth conifer stands, grasslands, wetlands, and other natural habitats associated with estuary areas above the mean high tide line are managed in near-natural, undisturbed habitat conditions.

##### B. Beach fringe identification:

###### 1. Primary beach fringe:

- a. The primary beach fringe is an area of essentially unmodified landscape of old growth forest that is approximately 500 feet slope distance inland from mean high tide around all coastline.

###### 2. Extended beach fringe:

- a. The extended beach fringe is an area of of essentially unmodified old growth forest that extends from approximately 500 feet to approximately 1000 feet slope distance inland from mean high tide around all coastline.

##### C. Estuary fringe identification:

1. The estuary fringe is an area of essentially unmodified old growth forest that is approximately 1000 feet slope distance inland from mean high tide around all identified estuaries. Estuaries are ecological systems at the mouths of streams where fresh and salt water mix, and where salt marshes and intertidal mudflats are present. The landward extent of an estuary is the limit of salt-tolerant vegetation, and the seaward extent is a stream's delta at mean low water.

##### D. Application

1. Apply the primary beach fringe in Alternatives 1,2,3,4,5,6, and 8.
2. Apply the extended beach fringe in Alternatives 1,3,4,5,6, and 8.
3. Apply the Estuary Fringe in Alternatives 1,2,3,4,5,6, and 8.

### Beach & Estuarine Management: BEACH2

#### I. Coordination

- A. Coordinate activities which directly affect the Coastal Zone with the State of Alaska Office of Management and Budget, Division of Governmental Coordination, to ensure

## II. Management

- A. Management is governed by the Land Use Designation in which the beach or estuary area is located. Where development is restricted (more restricted than allowed in the following standards and guidelines), such as in the wilderness and most of the natural setting Land Use Designations, the standards and guidelines of those Land Use Designations will apply. Where the Land Use Designation allows land and habitat modification, such as in the moderate and intensive development Land Use Designations, the following standards and guidelines will apply.
- B. Allow facility developments which require water access, such as docks, floats, or boat ramps.
  - 1. Locate facilities more than 1000 feet from the mouths of intertidal channels of known Class I anadromous fish streams or tidal or subtidal beds of aquatic vegetation to avoid significant impairment.
  - 2. Limit filling of intertidal and subtidal areas to the extent feasible.
- C. Suppress wildfires using the options identified in the Southeast Alaska/Prince William Sound Fire Management Plan. Suppression tactics should emphasize the least possible disturbance or evidence of human presence.
  - 1. Rehabilitation of all campsites, suppression lines, and other evidence of human presence will occur as soon as it is safe, but within one year after the fire occurs.
- D. Permit reasonable access to mining claims in accordance with the provisions of an approved plan of operations. Assure prospectors and claimants their right of ingress and egress granted under the General Mining Law of 1872, ANILCA, and National Forest Mining Regulations 36 CFR 228.
  - 1. Take advantage of topographic and vegetative screening when locating drill rigs, pumps, roads, rock quarries, structures, and marine transfer facilities.
  - 2. For areas seen from Visual Priority Travel Routes and Use Areas (see Appendix F), mitigate the effects on the visual resource due to mining activities. Examples of mitigation may include: a) designing quarry walls to have an irregular back line or to be low in height; b) locating material sites outside this beach and estuarine area; c) minimizing the scale of spoil/disposal areas in relation to the surrounding landscape as seen from sensitive viewpoints; d) using colors that simulate those found in the characteristic landscape and avoiding the use of reflective materials in project facilities; e) revegetating disturbed areas in accordance with project plans; f) shaping landform modifications to simulate naturally-occurring forms; and, g) designing reclamation so minerals activities leave a natural-appearing condition.
  - 3. Apply timing restrictions to minerals activities to avoid adverse impacts to fish and wildlife resources during critical periods (e.g. spawning, calving, mating, molting, or brood-rearing).
- E. Emphasize natural recreation settings and continue to provide the spectrum of outdoor recreation and tourism opportunities.
  - 1. Where feasible, schedule activities to avoid change to the existing Recreation Opportunity Spectrum (ROS) class in marine recreation settings.
  - 2. In locations where scheduled activities change the recreation setting(s), manage the new setting(s) in accordance with the appropriate ROS guidelines with emphasis on marine-related recreation activities.
  - 3. Design and locate recreation-related structures to be compatible with wildlife habitat needs. Manage user-created structures to maintain wildlife habitat values.
  - 4. Manage off-highway vehicle use to prevent degradation of lands or adverse disturbance of wildlife and fish populations.

5. Manage recreation and tourism use to maintain habitat capabilities of fish and wildlife resources.
- F. Allow subsistence use of timber by permit in accordance with ANILCA, Title VIII. Personal use firewood is inconsistent with management objectives but allowed if limited to locally determined areas. Subsistence users must comply with regulations and Forest Plan standards and guidelines for bald eagle nests (and their associated 330 foot radius habitat management zones), and direction for other beach fringe and estuary resources.
- G. Beach log salvage is permitted.
- H. The primary beach fringe and estuary areas are classified as unsuitable for timber management and no commercial timber harvest is permitted.
- I. The extended beach fringe (approximately 500-1000 feet) is suitable for timber production using only uneven-aged management harvest techniques with the following standards:
  1. Use only single tree or group selection with a maximum opening size of 2 acres. Manage for a distribution of opening sizes (range 0.1 to 2.0 acres) to emulate natural disturbance events and maintain old growth forest structure and composition at the landscape scale.
  2. Limit total disturbance to 10% of the area within a 100 acre contiguous analysis area every 5 decades.
  3. Total forest area removed for necessary roads or any catastrophic salvage contribute to the 10% maximum disturbance standard.
- J. Salvage will be limited to dead and/or down material resulting from catastrophic events (such as windthrow and insect or disease mortality). Limited standing green timber may be harvested during salvage operations for safety and operational considerations. Additional road construction is discouraged in beach and estuary fringes and in the extended beach fringe. Environmental analysis will determine if salvage sales are compatible with the objectives of the beach fringe and estuary area.
- K. Design proposed activities in the beach and estuary fringe to be subordinate to the characteristic landscape. Use existing form, line, color and texture found in the landscape.
  1. In the beach and estuary fringe, apply the Forest-wide Standards and Guidelines for the Partial Retention Visual Quality Objective, as seen from Visual Priority Routes and Use Areas (see Appendix F). This objective defines the maximum limit of allowable change to the visual character of the area; less visible evidence of activities, particularly in the visual foreground as seen from saltwater, is desirable.
  2. This Visual Quality Objective does not affect the Visual Quality Objective in the remainder of the land allocation within which the beach fringe or estuarine area is located.
- L. If no prudent alternative is available, road corridors may be designated to provide access for other management activities in this or adjacent land use designations. Roads within the extended beach fringe are preferable to the primary beach or estuary fringe.
  1. Perform integrated logging system and transportation analysis to determine if feasible upland road routes exist to avoid the primary beach, extended beach, and estuary area. Consider impacts to fish and wildlife, and road closure enforcement costs in this analysis.
  2. Determine road locations and road management objectives through the interdisciplinary team process. During development of road management objectives, give special attention to wildlife and fish habitat needs and the anticipated effects of human use on the habitat and populations using the habitat.
    - \* Provide or maintain recreational and community access where specifically determined necessary through interdisciplinary analysis.
  3. To meet the Visual Quality Objective of Partial Retention, give special consideration to minimizing apparent landform modification as seen from Visual Priority Routes and Use Areas.

- M. Log transfer facilities may be constructed.
  - 1. Use the Alaska Timber Task Force Siting Guidelines (see Appendix G & the log transfer facility standards and guidelines in the Transportation Forest-wide Standards and Guidelines section).
  - 2. To meet the Visual Quality Objective of Partial Retention, give special consideration to minimizing the visual impact of landform modification (as seen from Visual Priority Routes and Use Areas) during log transfer facility location, design, and construction.
  - 3. Roads and log transfer facilities located in the beach or estuary fringe should be cleared to the minimum feasible.
- N. Wildlife habitat restoration of young growth conifer stands is encouraged to accelerate development of advanced seral stand structure. Treatments may include thinning of young stands, release, pruning, and fertilization.

# **RIPARIAN**

## **Forest-wide Standards & Guidelines**

### **Riparian Area: RIP1**

#### ***I.Objectives***

- A. Seek to maintain riparian areas in natural conditions, for fish, other aquatic life, old-growth and riparian-associated wildlife species, water-related recreation and to provide for ecosystem processes, including important aquatic and land interactions. For further direction, refer to the Fish, Biodiversity, Wildlife, Recreation and Tourism, Beach Fringe and Estuary, and Soils and Water Forest-wide Standards and Guidelines. The following is a list of objectives pertaining to riparian areas. (Also consult FSM 2526.)
  1. Assure the protection of riparian habitat. (Consult Tongass Timber Reform Act, Section 103 (a); and ANILCA, section 705 (e).)
  2. Manage riparian areas for short and long-term productivity.
  3. Seek to maintain natural streambank and stream channel processes.
  4. Seek to maintain natural and beneficial quantities of large woody debris over the short and long term.
  5. Provide for the beneficial uses of riparian areas by maintaining water quality. (Consult Best Management Practices, Chapter 10 of the Soil & Water Conservation Handbook, FSH 2509.22 and Appendix C of this document.)
  6. Consider the management of both terrestrial and aquatic resources when managing riparian areas. Consider the effects of terrestrial and aquatic processes on riparian resources.
  7. In watersheds with intermingled land ownership, cooperate with the other landowners in striving to achieve healthy riparian areas.
  8. Coordinate road management activities to recognize the needs of wildlife and ensure passage of fish at road crossings. (Consult the Aquatic Habitat Management Handbook, FSH 2609.24.)
  9. Consider the effect of management (including windthrow) of adjacent areas on the riparian areas.
  10. Coordinate and consult with state and federal agencies on riparian management issues as appropriate. Meet state standards for federal consistency to the maximum extent practicable under the Coastal Zone Management Act and Alaska Coastal Management Program.

### **RIPARIAN INVENTORY: RIP2**

#### ***I. Inventory***

- A. Riparian areas encompass the zone of interaction between the aquatic and terrestrial ecosystems, including riparian streamsides, lakes and floodplains, with distinctive resource values and characteristics. Identify riparian areas during Forest and project planning. Computer-based inventory data which includes stream channel types, plant associations, landforms and soil types can be used. At the project implementation stage, more detailed inventory is required where riparian resources may be affected.
  1. Consult the Fish Forest-wide Standards and Guidelines for direction on maintenance of the channel type and stream class inventories.
  2. Consult the Soil and Water Forest-wide Standards and Guidelines for direction on maintenance of the soils, landforms, and plant association inventory (SRI inventory) and consult the Watershed Improvement Needs inventory.

# **RIPARIAN PLANNING: RIP3**

## **I. Project Planning**

- A. Where disturbances are planned, consider quantitative and qualitative factors such as:
- \* erosion processes
  - \* watershed hydrology
  - \* vegetation
  - \* stream channel morphology
  - \* water quality
  - \* species and habitats
  - \* human uses

Document analysis procedures and findings.

- B. On those projects and activities that are in, or influence, riparian areas, assure interdisciplinary involvement and consideration of riparian resources in project planning and in the environmental analysis process.
- C. Ensure that project plans are communicated to permittees, contractors, and purchasers and that they understand riparian objectives.
- D. Evaluate riparian area windthrow risk when locating and designing adjacent management activities. Minimize accelerated windthrow to the extent feasible. Consult BMP 12.6a of the Soil and Water Conservation Handbook.

## **II. General Standards and Guidelines by Activity**

### **A. Special Use Administration of Lands (Non-Recreation).**

1. Permit activities which are dependent upon riparian resources and do not significantly reduce the capability of the area to: 1) maintain or improve associated fish or wildlife habitat, or 2) protect water quality for beneficial uses.

### **B. Minerals and Geology Administration, plan of operations.**

1. Encourage use of state-of-the-art techniques for developing minerals to reduce impacts to the extent feasible. Include mitigation measures that are compatible with the scale of proposed development and commensurate with potential resource impacts.
2. Apply appropriate Transportation Forest-wide Standards and Guidelines to the location and construction of mining roads.
3. Manage mineral exploration and development activities to be compatible with the goals and objectives for riparian areas.
4. Manage mineral activities to maintain the present and continued productivity of anadromous fish and other foodfish habitat to the maximum extent feasible. (Consult ANILCA, Sec.505 (a).)
5. Apply timing restrictions to instream construction and other minerals activities, as needed, to protect fisheries habitat and mitigate adverse sedimentation; and to avoid critical wildlife mating, hatching, and migrating periods.
6. Minimize the effects of mineral development and related land disturbance activities on the beneficial uses of water by applying Best Management Practices.
7. Locate material sites and marine transfer facilities outside riparian areas if reasonable alternatives exist.
8. Ensure that disturbed areas are revegetated in accordance with project plans.
9. Approve reclamation plans in which mineral activities leave project areas as natural in appearance and function, as is feasible.

### **C. Recreation Use Administration**

1. Locate, design, and operate only those recreation projects which are necessary to accommodate public use of the water and shoreline areas (i.e., boat or

floatplane docks, launching ramps and associated access roads and trails). Where feasible, locate parking, campgrounds, sanitation and other recreation facilities outside the riparian areas to avoid adverse effects on water quality and riparian function.

2. For existing facilities, consider relocating the facility outside of the riparian area. Consideration should be based on current and anticipated effects on riparian values, desired recreation experience, public issues, application of Best Management Practices to minimize the effects of recreation facilities on the beneficial uses of water, and costs of relocating the facility.

#### D. Soil Inventory

1. Verify and define riparian areas and high hazard soils on the ground during project level planning.

#### E. Watershed Resource Planning

1. Manage activities to minimize adverse effects on the beneficial uses of water and to protect the aquatic and terrestrial riparian habitats, channel and streambanks, and provide for floodplain stability.
  - a. Identify soil and water quality requirements during the environmental analysis for project-level activities.
  - b. Apply Best Management Practices to minimize the effects of land disturbing activities on the beneficial uses of water.
  - c. Determine floodplain values and plan to avoid, where possible, the long and short-term adverse impacts to soil and water resources associated with the occupancy and modification of floodplains.

#### F. Timber Resource Planning

1. No commercial harvest is allowed within 100 feet distance either side of Class I streams and Class II streams which flow directly into a Class I stream (Tongass Timber Reform Act, 1990).
  - a. Included in the definition of Class II streams flowing directly into a Class I stream are all Class II tributaries of a Class II stream, that flow into a Class I stream without an intervening Class III segment. Mandatory minimum 100 foot buffers will not apply to: 1) A Class II stream that flows directly into the ocean, or joins a Class I stream only at lower than mean high tide; and 2) A Class II tributary stream segment that flows into an identifiable Class III stream that in turn flows into a Class I stream. These two instances clearly do not "...flow directly into..." a Class I stream.
  - b. The 100 foot measure is a horizontal distance measure from both bankfull margins.
2. Apply Best Management Practices to minimize the effects of timber harvest and related land disturbance activities on beneficial uses of water.
3. Discourage personal use woodcutting within 100 feet each side of Class I streams, and within 100 feet of Class II streams which flow directly into Class I streams. Avoid other riparian areas when other suitable locations for personal use woodcutting are available.

#### G. Timber Sale Preparation

1. In location and design of timber harvest activities, require special consideration and mitigation to ensure that riparian area characteristics for fish and wildlife habitat, water quality, and other riparian-associated resources are maintained.
2. Provide protection to fish and wildlife during critical periods of their life cycles by applying seasonal restrictions on timber harvest activities, as needed.
3. When stream crossings are required to harvest timber, perform site-specific investigations to determine the environmental impacts associated with constructing road crossings versus allowing yarding corridors, on the riparian areas.



4. Plan timber harvest settings that cross or include streamcourses or include V-notches to avoid significant adverse impacts to the riparian habitat or the soil and water resources. Unless stated otherwise in the Process Group direction, the following apply:
  - a. Trees or products yarded across or along streamcourses shall be fully suspended when crossing the streamcourse or yarding the full length of the stream or drainage, unless alternatives are developed in the operating plan or timber sale contract which meet the objectives for riparian areas.
  - b. Unless agreed otherwise in the operating plan or timber sale contract, and consistent with safe practices, trees identified for harvest should be felled so they do not fall within a "no commercial timber harvest" area in the riparian area or into a streamcourse. Trees may be wedged, jacked, lined, or otherwise pulled when necessary. Trees accidentally felled into streamcourses or windfallen trees shall be removed only following approval of the Sale Officer, and only in a manner consistent with the protection of the streamcourse and riparian area.
  - c. At the time agreed in the operating plan or timber sale contract, all trees, except those within guyline circles, which cannot be felled to avoid falling in streamcourses, should be left standing until yarding is in progress on the landing to which the trees will be yarded. Trees within the guyline circle will be felled as agreed in the operating plan or timber sale contract.
  - d. Split yard away from streams whenever feasible.
  - e. Interdisciplinary review of sale unit layout during planning should evaluate potential consequences of alternatives for cutting or leaving trees in V-notches. Among factors which should be considered are soil, watershed, and other resource information, blowdown potential, and yarding capability.
  - f. Allow salvage of material if objectives for the riparian area can be met. Where salvage is allowed, normally there will be no salvage within 100 feet in width on each side of Class I streams or on those Class II streams which flow directly into Class I streams. Salvage in the 100 feet on each side of Class I and II streams should only be considered in order to maintain or protect resources within the riparian area. This salvage does not contribute to the Allowable Sale Quantity.

### **III. Lakes and Ponds Specific Standards and Guidelines for Timber Harvest**

- A. Class I (anadromous lakes and high value sport and subsistence fisheries) Protection
  1. No commercial timber harvest within 100 feet of the lake margin or within the riparian area (greatest of riparian vegetation or soils, riparian associated wetland or one-site potential tree height (to be determined at the project level)).
  2. Allow only uneven-aged management for an additional 400 feet beyond the no commercial harvest zone.
- B. Class II (all remaining lakes and ponds greater than 5 acres)
  1. No commercial timber harvest within 100 feet of the lake margin.

### **IV. Stream Process Group Specific Standards and Guidelines for Timber Harvest**

Stream Process Groups is a classification of stream channels which share similar formative processes. They reflect the long term interaction of geology, landform, climate, and riparian vegetation. Classification considers the interrelationships between the runoff, sediment transport and vegetation along the stream banks. The following standards and guidelines are designed to provide essentially natural watershed function and channel processes.

The standards and guidelines are to be applied when a greater level of protection for the riparian area is not in effect (e.g. Designated Wilderness or LUD II areas).

- A. The guidelines which follow may be modified (See IV.F.1. for no commercial harvest standard). However, modification of these guidelines may occur only on a site-specific basis following an analysis of pertinent issues and documentation of the findings. Site-specific analysis should be conducted with a sound understanding of the physical and biological processes occurring within the watershed. Modification of the guidelines must meet the objectives for the riparian area and the stream process group and be approved by the responsible line officer.
- B. Stream Class IV will be treated as part of the hillside under slope stability standards and guidelines (see Soil and Water Forest-wide Standards and Guidelines). Apply Best Management Practices.
- C. **The three options presented by process groups represent three relative levels of risk of impacts to the stream channel processes and aquatic resources. Apply the options as in the following table:**

Application of Riparian Options by Alternative

	Alts.1,4,5,6,8	Alts. 2,7	Alt. 3	Alt. 9
Higher Value Watersheds*	Option 2	Option 3	Option 1	TTRA/BMP
Other Areas	Option 3	Option 3	Option 2	TTRA/BMP

\*These watersheds received a rating of 60 or higher in the fish portion of the Forest Habitat Integrity Plan (ADFG, 1982).

- D. The following tables provide the standards and guidelines for timber harvest activities. Special definitions for the tables:

- \* Where the direction states "no commercial timber harvest", this is a standard and means that commercial timber shall be prohibited (Tongass Timber Reform Act of 1990).
- \* Where the direction states "no programmed commercial timber", this is a guideline and means that no timber harvest will be scheduled, but that unprogrammed commercial timber harvest could be allowed. Among other reasons, unprogrammed commercial timber harvest may include timber sold as part of a salvage sale, for insect and disease abatement purposes, and for specialty wood products. Timber harvest would have to meet the objectives for the riparian area as determined by an analysis of site-specific conditions with an understanding of the watershed functions and stream channel processes.
- \* Site-potential tree height refers to the ability of a specific site to grow trees to a certain average height. The reason site-potential tree heights are identified is to give zones of special management which are within or adjacent to a riparian area an ecological foundation. Since large wood recruitment to the aquatic ecosystem is a primary concern, the maximum average tree height is considered to be the greatest width of concern for large wood recruitment. Average maximum tree heights for each channel process group will be used unless site-potential tree heights are calculated for channel types on a project basis.
- \* Distance for the first 100 feet from the stream channel is measured horizontally. All other measured distances are slope distances.

1. Process Groups (see following tables)

**Process Group: Moderate Gradient/Mixed Control**  
(MM1, MM2, and GO4 channels)

*Desired condition:* Provide for the retention and recruitment of large wood to the stream channel, and stable riparian vegetation for shade, floodplain dynamic processes and sources of organic inputs.

In the stream, do not diminish habitat condition through time. Use the fish habitat objectives (AFHA, 1995) as a reference to evaluate habitat conditions relative to the natural range for the process group. For MM channels these would include large wood size and distribution, pool size and frequency, and channel morphology.

*Objective:* Manage for large wood by assessing the site's old-growth type and managing for at least the minimum size distribution for large downed wood on floodplain and riparian stands. Maintain natural surface drainage patterns for floodplain areas. Maintain fish access to the entire range of habitat.

*Description:* These channels are commonly found in transition zones between High Gradient Contained streams and Floodplain channels. The MM channels are located in narrow valleys, footslopes or sloping and rolling lowlands. Stream channels gradients range from 2 to 6 percent. Channel containment is variable as structural control may be intermittent or only along one bank. Overall channel pattern is straight. Stream flow is dependent upon mountain slope runoff and the sediment regime is balanced (input equals output). Channel substrate ranges from coarse gravel to boulder size material. Typical site potential tree height is 120 feet.

**Application of Riparian Options by Alternative**

	Alts.1,4,5,6,8	Alts. 2,7	Alt. 3	Alt. 9
<b>Higher Value Watersheds</b>	<b>Option 2</b>	<b>Option 3</b>	<b>Option 1</b>	<b>TTRA/BMP</b>
<b>Other Areas</b>	<b>Option 3</b>	<b>Option 3</b>	<b>Option 2</b>	<b>TTRA/BMP</b>

<b>Stream Class/Activity</b>	<b>Option 1</b>	<b>Option 2</b>	<b>Option 3</b>
<b>I/Timber Harvest</b>	No programmed commercial harvest in the riparian area (greatest of floodplain, riparian vegetation or soils, riparian associated wetland fens, or 240 feet (the height of two site-potential trees)). Only unevenaged management is allowed for an additional 120 feet beyond the no harvest zone.	No programmed commercial harvest in the riparian area (greatest of floodplain, riparian vegetation or soils, riparian associated wetland fens, or 120 feet (the height of one site-potential tree)). Only unevenaged management is allowed for 120 feet beyond the no harvest zone.	No commercial timber harvest within 100 feet of the stream channel. Allow single tree selection on remainder of the riparian area (greatest of floodplain, riparian vegetation or soils, or riparian associated wetland fens).

Stream Class/Activity	Option 1	Option 2	Option 3
<b>II/Timber Harvest</b>	Same as for this option, Class I.	Same as for this option, Class I.	For streams flowing directly into a class I, same as for this option, Class I. For streams which do not flow directly into a Class I, allow single tree selection harvest within 25 feet of MM1 channels and within 60 feet of MM2 channels. All harvest methods are available outside of these areas.
<b>III/Timber Harvest</b>	Typically not present but if class III or IV occur use the guidelines for High Gradient Contained Class III or Class IV, as appropriate.	Same as Option 1.	Typically not present. When class III does occur, allow single tree selection within 25 feet of MM1 channels. All harvest methods are available on remaining area while meeting objectives.
<b>I,II &amp; III/Timber Salvage</b>	Not allowed.	Allow in the height of the 2nd site-potential tree area, while meeting objectives. Otherwise not allowed.	Allow, while meeting objectives.
<b>I,II &amp; III/Harvest Controls</b>	Fully suspend trees over the bankfull width of the stream when yarding. Minimize yarding corridors within the riparian area. Yard in a manner to assure no barring of mineral soil (<1%) and such that new channelization does not occur across the entire floodplain. The objective is to minimize surface soil disturbance and formation of new channels (BMP 13.9).	Same for all options.	Same for all options plus final harvest would incorporate undulating unit boundaries to limit the amount of continuous disturbance parallel to the streambank.
<b>I,II &amp; III/ Roads, Borrow Pits, Drainage Structures</b>	Special road construction techniques may be required to ensure fish passage. Maintain fish migration where needed and avoid diverting surface drainage channels.	Same for all options.	Same for all options.

Note: Except for the Standard "no commercial timber harvest requirement within 100 feet of Class I streams and Class II streams which flow directly into Class I's", the remaining guidelines may be modified. Modification of these guidelines may occur only on a site-specific basis following an analysis of pertinent issues and documentation of the findings.

**Process Group: High Gradient Contained**  
(HC1, HC2, HC3, HC4, HC5, HC6, HC8 and HC9 channels)

**Desired condition:** Maintain sideslope integrity (minimize surface erosion and accelerated mass wasting) and a long term supply of large wood structure to "meter out" sediment to downstream reaches and to provide sources of large wood downstream during debris flow events.

**Objectives:** Activities should not accelerate sideslope surface erosion or mass wasting. Maintain some instream large wood structure over the long-term where important for downslope channel processes which require wood as a component of natural debris torrents (varies by option).

**Description:** High Gradient Contained channels are located on mountain slopes. These are singular straight incised channels with steep slopes and channel gradients greater than 6 percent. Stream flow is dependent upon mountain slope runoff and may be intermittent. Sediment is readily transported through these channels. Substrate material ranges from cobble to bedrock. Riparian area includes incised channel sideslopes. Hemlock series dominates vegetation although spruce is also common. Some streams have intermittent flows. Steep gradients (>6%) limit fish capability. Typical site-potential tree height is 120 feet.

**Application of Riparian Options by Alternative**

	<b>Alts. 1,4,5,6,8</b>	<b>Alts. 2,7</b>	<b>Alt. 3</b>	<b>Alt. 9</b>
<b>Higher Value Watersheds</b>	<b>Option 2</b>	<b>Option 3</b>	<b>Option 1</b>	<b>TTRA/BMP</b>
<b>Other Areas</b>	<b>Option 3</b>	<b>Option 3</b>	<b>Option 2</b>	<b>TTRA/BMP</b>

<b>Stream Class/Activity</b>	<b>Option 1</b>	<b>Option 2</b>	<b>Option 3</b>
<b>I/Timber Harvest</b>	Typically not present but if they should occur treat the same as Class II, Option 1, or this process group.	Typically not present but if they should occur treat the same as Class II, Option 2.	Typically not present but if they should occur treat the same as Class II, Option 3.
<b>II/Timber Harvest (usually HC 1-4 &amp; 8)</b>	No programmed commercial timber harvest within the 100 feet of the stream or the top of the V-notch, whichever is greater, plus an additional distance of 120 feet (one site-potential tree height).	No programmed commercial timber harvest within 100 feet of the stream or to the top of the V-notch, whichever is greater. Programmed commercial harvest using only uneven-aged management techniques is allowed up to an additional 120 feet (one site-potential tree beyond the V-notch); design for windfirmness of the V-notch.	If Class II flows directly into a Class I, no commercial timber harvest within 100 feet of the stream channel. Beyond the no harvest zone, selectively leave trees with crowns that do not extend above the slope break. For streams which do not qualify for a 100 foot TTRA buffer, Selectively leave trees with crowns that do not extend above the slope break.

Stream Class/Activity	Option 1	Option 2	Option 3
<b>III/Timber Harvest (usually HC 5,6 &amp; 9)</b>	<u>HC 6 and 9:</u> No programmed commercial timber harvest within the V-notch and within an additional 120 feet (one site-potential tree) beyond the V-notch. For 120 feet (one-site potential tree) beyond the no harvest zone, manage for windfirmness of the V-notch and adjacent stand. <u>HC 5:</u> No programmed commercial timber harvest within the V-notch and within an additional 60 feet (one-half site-potential tree) beyond the V-notch. Manage an additional 60 feet (one-half site-potential tree) beyond the no harvest zone for windfirmness of the V-notch and adjacent stand.	No programmed commercial timber harvest within the V-notch plus manage an additional 120 feet (one-site potential tree) beyond the V-notch for windfirmness of the V-notch. (It is anticipated that following site-specific analysis application of this guideline may be modified to be similar to Option 3 in 25% of the sites.)	Allow harvest to the stream bank while meeting objectives. (It is anticipated, following site specific analysis, this guideline may be modified to be similar to Option 2 in about 30% of the sites.)
<b>I, II &amp; III/Salvage</b>	no salvage except to further riparian objectives	Same as option #1.	Allow salvage while meeting objectives.
<b>I, II &amp; III/Harvest Controls</b>	Minimize yarding corridors within the riparian areas	Same as option #1.	Minimize soil disturbance associated with yarding within inner gorge. Full suspension is required to cross the stream channel. Harvest rate is not to exceed 25% of the acres (in this land use designation) every 20 years of a 3rd order or larger watershed.
<b>I, II, &amp; III/Roads, Borrow Pits, Drainage Structures</b>	Borrow pits are generally not appropriate in HC channel process group. Road and road crossings should be designed and constructed to minimize soil runoff to the channel, retain natural drainage patterns and minimize changes to the natural rates of sediment transport.	Same as option #1.	Same as option #1.

Note: Except for the Standard "no commercial timber harvest requirement within 100 feet of Class I streams and Class II streams which flow directly into Class I's", the remaining guidelines may be modified. Modification of these guidelines may occur only on a site-specific basis following an analysis of pertinent issues and documentation of the findings.

**Process Group: Alluvial Fan**  
(AF1, AF2 and AF8 channels)

*Desired condition:* Option 1 & 2: Provide for the long-term retention and recruitment of very large wood (near the maximize size that sites will grow) distributed across the entire alluvial fan. Option 3: Provide for long-term retention and recruitment of large wood (near the size of a site-potential tree) distributed on the active portion of the alluvial fan. (Note: streams move across the face of the entire fan over time; it is often difficult to predict from year to year where that stream will be located. For sediment retention and metering of sediment into stream systems, as well as to supply pool rearing habitat for fish, a supply of large wood is required. Large wood is often excavated by fluvial processes on the fan.)

Within the stream, meet the natural range of aquatic habitat features.

*Objective:* Manage for large wood by assessing the site's old-growth type and managing for at least the minimum size distribution for large-downed wood and standing trees. (reference Regional Old Growth Definition Book (R10-TP-28)). and fish habitat objectives for large wood.)

*Description:* Alluvial fan channels flow directly over the alluvial fan landform. These are dynamic multi-branched channels that periodically change course within the landform. Stream gradient ranges from 1 to 3 percent on the lower half of the alluvial fan and increases toward the fan apex. The AF channel is associated with HC channels therefore streamflow is dependent on mountain slope runoff. Groundwater discharge is also significant. Surface flow may be intermittent as substrate consists of sand to cobble size material. During low flow periods stream flow may run subsurface in the middle section of the alluvial fan and emerge on the lower section. Aggradation of material is the dominant process on the alluvial fan and fine sediment may be deposited in the low gradient section. Alluvial fans typically support large spruce with diameters (DBH) of 30" and have average site-potential tree heights of 140 feet. Downed wood serves as nurse logs for regeneration.

**Application of Riparian Options by Alternative**

	Alts.1,4,5,6,8	Alts. 2,7	Alt. 3	Alt. 9
<b>Higher Value Watersheds</b>	<b>Option 2</b>	<b>Option 3</b>	<b>Option 1</b>	<b>TTRA/BMP</b>
<b>Other Areas</b>	<b>Option 3</b>	<b>Option 3</b>	<b>Option 2</b>	<b>TTRA/BMP</b>

<b>Stream Class/Activity</b>	<b>Option 1</b>	<b>Option 2</b>	<b>Option 3</b>
<b>I, II,/Timber Harvest</b>	No programmed commercial harvest on the alluvial fan.	No programmed commercial harvest within the greater of the active portion of the alluvial fan or 140 feet (the height of one site-potential tree) from the current channel plus unevenaged management across the remainder of the alluvial fan with the objective of leaving large trees within the stand for future stream recruitment.	No commercial harvest within 100 feet of a Class I stream or a Class II flowing directly into a Class I. All harvest methods are available on remaining inactive portion of fan while meeting objectives.

Stream Class/Activity	Option 1	Option 2	Option 3
<b>III/Timber Harvest</b>	Same stream Class I.	Same as stream Class I.	No programmed commercial harvest within the active portion of the alluvial fan or 25 feet of streambank, whichever is greater. All harvest methods are available on remaining inactive portion of fan while meeting objectives.
<b>I, II &amp; III/Timber Salvage</b>	Salvage should be designed to comply with the prescription requirements listed above.	Same as option #1.	Same as option #1.
<b>I, II &amp; III/Harvest Controls</b>	Yard in a manner to minimize barring of mineral soil and such that new channelization does not occur across the entire alluvial fan. The objective is to minimize alder growth and formation of new channels (ref. BMP 13.9). Where trees are removed, utility/cull logs should be left distributed across the alluvial fan.	Same as option #1.	Same as option #1.
<b>I, II &amp; III/Roads, Borrow Pits, Drainage Structures</b>	Discourage use as borrow sources. Do not allow borrow pits on active fan. Avoid crossing fans where possible. If required, use bridges or depending on protected use, hardened fords, near fan apex. If culverts are used, consider as temporary structures (design for 25 year event). The objective is to maintain fish migration where needed and avoid diverting stream channels.	Same as option #1.	Same as option #1.

Note: Except for the Standard "no commercial timber harvest requirement within 100 feet of Class I streams and Class II streams which flow directly into Class I's", the remaining guidelines may be modified. Modification of these guidelines may occur only on a site-specific basis following an analysis of pertinent issues and documentation of the findings.



**Process Group: Floodplain/Glacial Outwash**  
(FP1, FP2, FP3, FP4, FP5, GO1, GO2, GO3 channel types)

*Desired condition:* Provide for the retention and recruitment of large wood over the long term, distributed across the floodplain. Maintain natural floodplain function: flood mitigation, surface-groundwater exchange, water temperature moderation and off-channel habitat. In the stream channel meet the natural range of aquatic habitat features (large wood size and distribution, pool size and frequency, spawning gravel quality and channel morphometry).

*Objective:* Manage for large wood by assessing the site's old-growth type and managing for at least the minimum size distribution for large downed wood and standing trees (OGD). Meet fish habitat objectives (AFHA). Maintain natural surface drainage pattern. Maintain fish access to entire range of habitat.

*Description:* Flood Plain and Glacial Outwash channels are associated with the valley bottom flood plain landform. These two process groups contain low gradient sinuous singular or anabranching channels. Braided channels are more prevalent in the Glacial Outwash process group. Mountain slope runoff and ground water discharge control stream flow in the FP group while glacial melt controls flow in the GO group. Peak flows may occur in the spring and fall in the FP group while in summer for the GO group. Sediment deposition is the dominant process in both groups. Substrate material ranges from sand to cobble size material in both groups.

Floodplains support standing old growth spruce with heights of up to 130 feet. Downed wood provides nurse logs for regeneration, sediment retention, and infiltration. Floodplain width may exceed 200 feet on FP4 and FP5 channels, but are generally less than 200 feet on FP3 channels. These areas are typically highly productive for fish. Large wood and off channel rearing areas are of particular significance as habitat features.

**Application of Riparian Options by Alternative**

	Alts.1,4,5,6,8	Alts. 2,7	Alt. 3	Alt. 9
<b>Higher Value Watersheds</b>	<b>Option 2</b>	<b>Option 3</b>	<b>Option 1</b>	<b>TTRA/BMP</b>
<b>Other Areas</b>	<b>Option 3</b>	<b>Option 3</b>	<b>Option 2</b>	<b>TTRA/BMP</b>

<b>Stream Class/Activity</b>	<b>Option 1</b>	<b>Option 2</b>	<b>Option 3</b>
<b>I/Timber Harvest (excluding FP3s not associated with other floodplain channel types)</b>	No programmed commercial harvest in the riparian management area (greatest of floodplain, riparian vegetation or soils, riparian associated wetland fens, or 130 feet (the height of one site-potential tree)). Only unevenaged management is allowed for an additional 130 feet (the height of one site-potential tree) beyond the no harvest zone.	Same as option #1.	No commercial harvest within 100 feet of the stream. Allow no programmed commercial timber harvest within an additional 100 feet in width on each side of the stream.  If the riparian extends beyond 200 feet from the stream channel, consider all harvest methods on a case-by-case basis.

Stream Class/Activity	Option 1	Option 2	Option 3
<b>FP3 (not associated with other floodplain channel types)/Timber Harvest</b>	Same as above.	Same as above.	Allow single tree selection harvest within an additional 100 feet beyond the no harvest zone.
<b>II/Timber Harvest</b>	Same as for this option, Class I.	Same as for this option, Class I.	Typically not present. For streams which do not flow directly into a Class I, use the same guidance as the Alluvial fan process group class II.
<b>III/Timber Harvest</b>	Typically not present. Use the same guidance as Class I for this Option.	Typically not present. Use the same guidance as Class I for this Option.	Typically not present. Use the same guidance as found in Alluvial fan process group class III.
<b>I, II &amp; III/Harvest Controls</b>	Yard in a manner to minimize barring of mineral soil (<1%) and such that new channelization does not occur across the floodplain. The objective is to minimize alder growth and formation of new channels (BMP 13.9).	Same as Option 1.	Where harvest occurs within the floodplain but beyond 100 feet from the stream, strive to maintain 90% of the normal basal area with trees 16"+ dbh within areas with no programmed commercial timber harvest. Where trees are removed utility/cull logs should be distributed across the floodplain.
<b>I, II &amp; III/Timber Salvage</b>	No harvest allowed.	Allow in the height of the 2nd site-potential tree area, while meeting objectives. Otherwise not allowed.	Not allowed where programmed commercial harvest is not allowed unless needed to meet process group objectives (e.g. windthrown trees restricting fish passage in streams.) Allow in other areas while meeting objectives.
<b>I, II &amp; III/Roads, Borrow Pits, Drainage Structures</b>	Locate roads only when other feasible routes do not exist (BMP 14.2). Develop stream course protection plans when stream crossings are necessary. Do not develop borrow pits within the active floodplain (BMP 14.9). The objective is to maintain fish migration where needed and avoid diverting surface drainage channels.	Same as option 1.	Same as option 1.

Note: Except for the Standard "no commercial timber harvest requirement within 100 feet of Class I streams and Class II streams which flow directly into Class I's", the remaining guidelines may be modified. Modification of these guidelines may occur only on a site-specific basis following an analysis of pertinent issues and documentation of the findings.

**Process Group: Large Contained**  
(LC1 and LC2 channels)

*Desired condition:* Provide for retention and recruitment of large wood to the stream channel, and riparian vegetation for maintaining stable channel sideslopes, shade and organic inputs.

In the stream, meet the natural range of aquatic habitat features for large wood size and distribution and pool size and frequency.

*Objectives:* No increase in sideslope surface erosion or mass wasting. Meet fish habitat objectives for large wood and pools.

*Description:* Large Contained channels are associated with canyons or sloping lowlands. These are low gradient (less than 3 percent), singular, straight and entrenched channels with gravel to bedrock substrate. Sediment regime balances input with output. Stream flow is dependent upon mountain slope or lowland runoff.

Riparian area includes incised channel sideslopes and terraced alluvial floodplain. Habitat is often limited by a scarcity of stable large wood structures. Riparian vegetation communities are varied. Riparian width, including floodplain and sideslope breaks reach 150' (LC1) to 190' (LC2). A site potential tree reaches an average height of 100 feet.

**Application of Riparian Options by Alternative**

	Alts.1,4,5,6,8	Alts. 2,7	Alt. 3	Alt. 9
<b>Higher Value Watersheds</b>	<b>Option 2</b>	<b>Option 3</b>	<b>Option 1</b>	<b>TTRA/BMP</b>
<b>Other Areas</b>	<b>Option 3</b>	<b>Option 3</b>	<b>Option 2</b>	<b>TTRA/BMP</b>

<b>Stream Class/Activity</b>	<b>Option 1</b>	<b>Option 2</b>	<b>Option 3</b>
<b>I and II's which flow directly into I's/Timber Harvest</b>	No programmed harvest on channel sideslope break plus an additional 100 feet (one site-potential tree height) beyond the slope break. Manage an additional 100 feet (site-potential tree height) beyond the no harvest zone to reduce the risk of windthrow, where appropriate	No programmed harvest on channel sideslope break. Manage an additional 100 feet (site-potential tree height) beyond the no harvest zone (gorge) to reduce risk of windthrow, where appropriate.	No commercial timber harvest within 100 feet of the stream.
<b>other II's/Timber Harvest</b>	Extremely rare. If they should occur, treat as the corresponding stream class in the HC process group.	Same as option #1.	Allow no programmed commercial timber harvest within 25 feet of stream.
<b>III/Timber Harvest</b>	Same as "other II's".	Same as "other II's".	Extremely rare. If they should occur, treat same as Moderate Gradient Contained Process Group, Class III.

Stream Class/Activity	Option 1	Option 2	Option 3
<b>I &amp; II/Timber Salvage</b>	Allow no salvage in the areas identified for no programmed harvest in the Class I, Option 1 guidance.	Allow no salvage in the areas identified for no programmed harvest in the Class I, Option 2 guidance.	Allow salvage while meeting objectives for the process group.
<b>I &amp; II/Harvest Controls</b>	Fully suspend trees over the bankfull stream when yarding. Minimize yarding corridors within the riparian area. Yard in a manner to assure no delivery of sediment from channel sideslopes.	Same as Option 1.	Same as Option 1.
<b>I, II &amp; III/Roads, Borrow Pits, Drainage Structures</b>	Generally not appropriate in this process group. Where road crossings are required, minimize erosion and sedimentation associated with road crossing approaches within inner gorge. Fish migration should not be impeded by road crossings.	Same as option #1.	Same as option #1.

Note: Except for the Standard "no commercial timber harvest requirement within 100 feet of Class I streams and Class II streams which flow directly into Class I's", the remaining guidelines may be modified. Modification of these guidelines may occur only on a site-specific basis following an analysis of pertinent issues and documentation of the findings.

## **Process Group: Moderate Gradient Contained**

(MC1, MC2 and MC3 channels)

*Desired condition:* Provide for retention and recruitment of large wood to the stream channel, and riparian vegetation for maintaining stable channel sideslopes, shade and organic inputs.

In the stream, meet the natural range of aquatic habitat features for large wood size and distribution and pool size and frequency.

*Objectives:* No increase in sideslope surface erosion or mass wasting. Meet fish habitat objectives for large wood and pools.

*Description:* Moderate Gradient Contained channels are associated with sloping or rolling lowlands. Stream gradient ranges from 2 to 6 percent for these singular, straight and entrenched channels. Stream flow is dependent upon mountain slope runoff. Sediment is transported through these channels. Substrate is dominated by cobble, boulder and bedrock material.

Riparian area includes incised channel sideslopes and terraced alluvial floodplain. Habitat is often limited by stable large wood structures. Riparian vegetation communities are varied. Riparian width, including floodplain and sideslope breaks reach 60' to 70'. A site potential tree height is 100 feet.

**Application of Riparian Options by Alternative**

	<b>Alts.1,4,5,6,8</b>	<b>Alts. 2,7</b>	<b>Alt. 3</b>	<b>Alt. 9</b>
<b>Higher Value Watersheds</b>	<b>Option 2</b>	<b>Option 3</b>	<b>Option 1</b>	<b>TTRA/BMP</b>
<b>Other Areas</b>	<b>Option 3</b>	<b>Option 3</b>	<b>Option 2</b>	<b>TTRA/BMP</b>

<b>Stream Class/Activity</b>	<b>Option 1</b>	<b>Option 2</b>	<b>Option 3</b>
<b>I and II's which flow directly into I's/Timber Harvest</b>	<u>MC1,MC2 and MC3</u> No programmed harvest on channel sideslope break plus an additional 100 feet (one site-potential tree height) beyond slope break. Manage an additional 100 feet (site-potential tree height) beyond the no harvest zone to reduce risk of windthrow, where appropriate.	<u>MC1</u> No programmed harvest for the channel sideslopes plus an additional 100 feet (one site-potential tree height). <u>MC2 and MC3</u> No programmed harvest within channel sideslope break. Manage an additional 100 feet (one site-potential tree height) beyond the no harvest zone (gorge) to reduce risk of windthrow, where appropriate.	Allow no commercial timber harvest within 100 feet of the stream. Beyond 100 feet, selectively leave trees with crowns that do not extend above the slope break.
<b>other II's/Timber Harvest</b>	Same as option #1 for Stream Class I	<u>MC1</u> No harvest within 100'. <u>MC2 and MC3</u> No harvest within 100' or on sideslopes whichever is greater.	Selectively leave trees with crowns that do not extend above the slope break.
<b>III/Timber Harvest</b>	Unusual, treat like HC process group class III.	Same as option 1.	All harvest methods are available while meeting objectives.

Stream Class/Activity	Option 1	Option 2	Option 3
<b>I, II &amp; III/Timber Salvage</b>	Allow no salvage in the areas identified for no programmed harvest in the Class I, Option 1 guidance.	Allow no salvage in the areas identified for no programmed harvest in the Class I, Option 2 guidance.	Allow salvage while meeting objectives.
<b>I, II &amp; III/Harvest Controls</b>	Fully suspend trees over the bankfull stream when yarding. Minimize yarding corridors within the riparian area. Yard in a manner to minimize delivery of sediment from channel sideslopes.	Same as Option 1.	Minimize soil disturbance associated with yarding within the inner gorge.
<b>I, II &amp; III/Roads, Borrow Pits, Drainage Structures</b>	Where road crossings are required, minimize erosion and sedimentation associated with road crossing approaches within inner gorge. Fish migration should not be impeded by road crossings.	Same as option #1.	Same as option #1.

Note: Except for the Standard "no commercial timber harvest requirement within 100 feet of Class I streams and Class II streams which flow directly into Class I's", the remaining guidelines may be modified. Modification of these guidelines may occur only on a site-specific basis following an analysis of pertinent issues and documentation of the findings.

**Process Group: Palustrine**  
(PA1,PA2, PA3, PA4 and PA5 channels)

*Desired condition:* Maintain habitat diversity for rearing salmonids, canopy shading, organic recruitment for food and cover.

*Objectives:* Maintain streambank structure. Meet fish habitat objectives for width to depth ratios. Maintain recruitment of large wood for cover habitat. Meet fish habitat objectives for large woody debris and undercut banks.

*Description:* Palustrine channels are associated with lowland landforms and wetlands. Channel gradients are less than 1 percent. Palustrine channels are singular and sinuous. Stream flow is dependent on peatland and lowland runoff. Sediment storage is the dominant process. Substrate material ranges from fine organic material to coarse gravel.

Riparian vegetation includes mixed conifer, shore pine, and non-forest. Site-potential tree height is generally less than 85'.

**Application of Riparian Options by Alternative**

	Alts.1,4,5,6,8	Alts. 2,7	Alt. 3	Alt. 9
<b>Higher Value Watersheds</b>	<b>Option 2</b>	<b>Option 3</b>	<b>Option 1</b>	<b>TTRA/BMP</b>
<b>Other Areas</b>	<b>Option 3</b>	<b>Option 3</b>	<b>Option 2</b>	<b>TTRA/BMP</b>

<b>Stream Class/Activity</b>	<b>Option 1</b>	<b>Option 2</b>	<b>Option 3</b>
<b>I &amp; II/Timber Harvest</b>	No programmed commercial harvest in the riparian area (greatest of floodplain, riparian vegetation or soils or riparian associated wetland fens). Only unevenaged management is allowed for an additional 100 feet (one site-potential tree height) beyond the no harvest zone.	Same as option #1	Allow no commercial timber harvest within 100 feet of the stream channel or within the riparian management area (greatest of floodplain, riparian vegetation, or soils, riparian associated wetland fens or one site potential tree).
<b>III/Timber Harvest</b>	These stream classes do not normally occur in this process group. If either should occur, treat as Moderate Gradient Contained process group.	Same as option #1.	All harvest methods are available while meeting objectives.
<b>I, II &amp; III/Timber Salvage</b>	Allow no salvage in the areas identified for no programmed harvest in the Class I, Option 1 guidance.	Allow no salvage in the areas identified for no programmed harvest in the Class I, Option 2 guidance.	Allow no salvage in the areas identified for no programmed harvest in the Class I, Option 3 guidance.

Stream Class/Activity	Option 1	Option 2	Option 3
I, II & III/Harvest Controls	Fully suspend trees over the bankfull stream when yarding. Minimize yarding corridors within the riparian area. Yard in a manner to minimize delivery of sediment from channel sideslopes. Use wetland guidelines	Same as option 1.	Same as option 1.
I, II & III/Roads, Borrow Pits, Drainage Structures	Wetland functions and fish passage receive special attention in locating roads.	Same as option 1.	Same as option 1.

Note: Except for the Standard "no commercial timber harvest requirement within 100 feet of Class I streams and Class II streams which flow directly into Class I's", the remaining guidelines may be modified. Modification of these guidelines may occur only on a site-specific basis following an analysis of pertinent issues and documentation of the findings.



**from WILDLIFE**  
**Forest-wide Standards & Guidelines**

**IV. Sitka Black-tailed Deer Habitat (ALTERNATIVES 1,3,4,5, and 6 ONLY)**

**A. Habitat management objective**

1. The objective is to maintain deer habitat capability sufficient to meet the needs of sport and subsistence hunters and maintain a resilient prey base for predators.

**B. Habitat Conservation**

1. Assess deer habitat capability within Wildlife Analysis Areas relative to the demand/use of the deer resource by sport and subsistence users. Use the most recent version of the interagency deer habitat capability model to determine current and projected deer habitat capability. Deer demand/use is the mean annual deer harvest within WAA's from 1987-1994.
2. Maintain all current total deer habitat capability in WAA's where the deer demand/use (as defined above) is greater than 20% of the total deer habitat capability.
3. Seek to maintain important deer winter range in WAA's where average deer harvest represents 10%-20% of deer habitat capability. Important deer winter range is defined as acres with deer habitat suitability scores in the 25th percentile or higher in each WAA based upon the most recent version of the interagency deer habitat capability model.
4. In WAA's where mean annual hunter deer harvest is less than 10% of deer habitat capability, no specific deer habitat protection measures are prescribed.

**IV. Sitka Black-tailed Deer Habitat (ALTERNATIVES 2,7,8 AND 9 ONLY)**

1. Identify important deer winter range in project level analysis.
2. Assure interdisciplinary involvement and consideration of deer winter range in project planning and in the environmental analysis process.

# CAVE RESOURCES

## Forest-wide Direction and Standards & Guidelines

### Cave Management Program

#### I. Management

- A. The Forest shall maintain a cave resource management program to identify, evaluate, preserve, and protect caves and their environments. Cave resources shall be managed on a Forest-wide and project specific level in compliance with the Federal Cave Resource Protection Act of 1988 and its implementing regulations. Consult 36 CFR Part 261 and 290 and FSM 2356.
- B. Land managers shall seek participation from interested publics, such as caving organizations, scientists, and recreationists in managing cave resources.
- C. The Forest shall develop an appropriate interpretative plan which addresses caves and cave resources, how these relate to karst processes, the intrinsic karst resource values and other surface management programs. The Forest will promote public education programs to insure an increased understanding of the value of these irreplaceable resources and the need to manage these unique ecosystems appropriately.
- D. The Forest shall coordinate cave resource management with the management of other surface resources.

#### II. Definitions

- A. Due to the uniqueness of the cave resources, definition of several terms is needed for a better understanding of the resource. The following terms are used throughout the Forest-wide Direction and Standard and Guidelines.

- 1. "Cave" is legally defined under federal law as: "... any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made. Such term shall include any natural pit, sinkhole, or other feature which is an extension of the surface"(Federal Cave Resource Protection Act, 1988). This definition includes the following features:

a)"*Significant Karst Features*" (SKF) are those features within karst topography which have direct atmospheric and/or hydrologic connection. These may be streamsink, collapse, and solution dolines, solution channels, or vertical shafts. These are primarily stream insurgence and resurgence points, and cave entrances.

b)"*Doline*" or "*sinkhole*" (used interchangeably) are terms used to describe relatively shallow, bowl- or funnel-shaped depressions ranging in diameter from a few to more than 3000 feet. These depressions are generally formed by dissolution of and subsequent settlement of bedrock to form a depression or collapse of shallow cave roofs to form a depression.

Speleologists use "cave" to refer to all parts, regardless of size, of an underground system that links openings and chambers and that may connect the system to the surface. The most common type of cave is formed in limestone by dissolution. Included in the term caves are tree molds and lava tubes associated with lava flows, erosional caves, as well as those formed by dissolution of bedrock.

2. "*Cave Resources*" includes any material or substance occurring naturally in caves on Federal Lands, such as animal life, plant life, paleontological resources, cultural resources, sediments, minerals, speleogens, and speleothems.
3. "*Significant cave*" means a cave located on Federal Lands that has been evaluated by the authorized officer and determined to have biotic, cultural, mineralogical, paleontologic, geologic, hydrologic, or other resources that have important values for scientific, educational, or recreational purposes.
4. "*Karst*" is defined as a type of topography that develops in areas underlain by soluble rocks, primarily limestones. Dissolution of the subsurface strata results in areas of well-developed sub-surface drainage characterized by dolines, collapsed channels, vertical shafts, and caves. Areas on which karst has developed is said to display "karst topography" or referred to as a "karst landscape".
5. "*Speleothem*" means any natural mineral formation or deposit occurring in a cave or lava tube, including but not limited to any stalactite, stalagmite, helictite, cave flower, flowstone, concretion, drapery, rimstone, or formation of clay or mud.
6. "*Speleogen*" refers to relief features on the walls, ceiling, and floor of any cave or lava tube which are part of the surrounding bedrock, including but not limited to anastomoses, scallops, meander niches, petromorphs and rock pendants in solution caves and similar features unique to volcanic caves.

### III. Planning

- A. The Forest shall develop and maintain a cave resource inventory, identifying both known and potential cave locations including significant karst features. This inventory will provide resource managers with knowledge of areas where caves and related unique geologic features do, or are likely to exist. Areas where karst topography is known to exist and potential karst areas shall be identified. This will allow land managers to better schedule activities, knowing that a cave resource assessment is needed if the planned activity falls within an area where caves can and/or do exist.
- B. Manage caves and cave resources using an interdisciplinary approach. Caves, including significant karst features, shall be considered in all land use planning decisions. Include interested publics and the caving community in the public involvement process.
- C. The cave resource inventory shall be updated and maintained as new areas are identified. The inventory may be kept within the GIS system as long as adequate security of cave location can be maintained.

### IV. Significance/Inventory/Project Clearance

- A. Significance: Significant caves and cave resources will be evaluated as required by the Federal Cave Resources Protection Act of 1988. The first purpose of the Act is to secure, protect, and preserve these resources on Federal lands for the perpetual use, enjoyment, and benefit of all people. Within the Tongass NF,

cave and cave resources generally occur in areas of karst topography. Inventory of karst topography to identify caves and cave resources is an essential first step to understand what "significant" resource values exist. Survey of all caves is needed to determine if significant resource values exist. The current definition of "significant" may change as our knowledge of caves and cave resources increase. Caves and cave resources shall be classified as "significant", if during survey any of the following resource values are inventoried:

1. **Biological:** If components are very numerous and highly sensitive to disturbance, if habitat is critical to species survival, and if the cave contains unique species, or ones found on State or Federal sensitive, threatened, or endangered species lists. If the cave provides important seasonal habitat for bats or other non-endemic species.
2. **Hydrological:** If components are unique, complex, or highly sensitive and part of a larger underground hydrologic system. If the cave conducts water to domestic water supplies or the water quality is important to wildlife, fisheries, or humans.
3. **Geological:** If unique geologic information is apparent within the passages of the cave. Also caves formed by unusual geologic processes or ones demonstrative of unusual geologic processes. The presence of sediment deposits or features important for evaluating geologic events locally or regionally.
4. **Mineralogical:** Presence of abundant, sensitive, or unique speleothems and/or minerals.
5. **Paleontological:** Presence of any important fossil remains, either within cave deposits or within the walls of the caves.
6. **Educational or Scientific:** Caves, which by virtue of their location, contents, or special associations offer unusual opportunity for interpretation and public education or scientific study.
7. **Cultural:** Presence of historic or prehistoric artifacts which would make the site eligible for the National Register of Historic Places or other materials or deposits which could be damaged if not managed. Also includes caves which are important to local regional or national history even though there may be no deposits to be disturbed as well as caves of important religious significance to native populations.
8. **Recreational:** Caves which receive heavy recreational use or ones considered by outside interests to be of importance for the challenge or adventure they provide including caves considered of interest to recreationalists or caves with high scenic values.
9. **Regional/ National/ International Ranking:** Caves which by nature of their length, volume, total depth, pit depth, or height places them within the upper 25 percent of regional, national, or international records. Caves with other unusual or unique features, associations, or recognition are also included.

Any cave may contain one or all of these values. The Forest shall consult the National Speleological Society, local Grottos, and experienced cavers for assistance in determining significance. Caves determined to be significant, as defined above, will be considered for listing on the National Significant Cave List. Specific locations of Significant Caves are exempt from disclosure to the general public.

- B. **Inventory:** The Forest shall continue to work with the national and local caving community and other interested publics to locate, map, and describe caves and to evaluate the significant resource values discovered. The inventory process should document all unique biological, hydrological, geological, mineralogical, paleontological, educational or scientific, cultural, and/or recreational values. Care should be taken to analyze the surface to sub-surface inter-connection of the ecosystem. Biological studies shall be conducted to determine the presence of threatened, endangered, and/or sensitive species and to better define the ecosystems present in the karst features. Forest personnel will be responsible for reporting any karst features found in the field. This includes features such as sinkholes, collapsed channels, caves, resurgence streams, and areas where surface drainage becomes subsurface, etc. To aid Forest personnel in identifying these features on the ground, education programs and an inventory reporting system should be developed.
- C. A comprehensive analysis of Cave Resource Management should be completed by the Forest on known cave resources within five years after approval of the Forest Plan. Management strategies shall be prepared for caves determined to be significant and for others where hazardous conditions exist. The management strategy will include an inventory and mapping of cave resources, development of research and monitoring programs, interpretive and recreation programs, and when necessary, a cleanup or restoration programs. Management strategies will be developed on a cave by cave basis. If the analysis determines that cave management or protection is required, the cave should be placed in one of the following classes.

#### Class 1: Sensitive Caves

Caves considered unsuitable for exploration by the general public either because of their pristine condition, unique resources, or extreme safety hazards. They may contain resources that would be impacted by low level visitation. These caves are not shown on maps or discussed in publications intended for general public use such as guides, brochures, and magazines. Scientific studies within these caves will be encouraged.

#### Class 2: Directed Access Caves

Caves with directed public access and developed for public use and enjoyment. These caves are shown on maps or have signs directing visitor access. Regardless of the level of development, public visitation is encouraged. These caves could have improved access, developed trails, artificial lighting, and guided tours. Interpretive materials should be available on these caves. The caves may have sensitive resources that are protected. Access may be through a reservation system.

#### Class 3: Undeveloped Caves

Caves that are undeveloped or contain minimal developments that are suited for persons who are properly prepared. Some of these caves would require technical skills beyond that of the average Forest visitor and could present substantial hazards to the user. In general, these caves are those where it has been determined that recreational use will not substantially degrade the caves resources or special values. Location of these caves will be available to the public upon request, however, public use will not be directed toward them.

- D. All newly discovered caves will be temporarily managed as Class 1 until an analysis of resource values is completed. Following analysis, each cave will be designated either Class 1, 2, of 3 if appropriate.
- E. Caves determined through analysis to have no significant values, and documented as such, will no longer be protected.
- F. Project Clearance: The Federal Cave Resources Protection Act of 1988 requires that surface management activities assure that caves under consideration for the National Significant Caves List are protected during the period of consideration. Any management activity that can directly or indirectly affect the ecosystem of the cave resource shall not proceed until cave resources clearance has been approved by the District Ranger or Forest Supervisor as appropriate. If a previously undiscovered site is found during the course of a project, the project administrator shall halt any work that might potentially damage the cave resource. Work may resume after consultation with the local cave management specialist, resource inventory and analysis has been completed to determine significance, and appropriate mitigation measures, if needed, are applied.

## V. Standards & Guidelines

- A. Prior to determination of significance under the 1988 Cave Act, or Forest-wide comprehensive cave management analysis, the following direction is applicable:
  - 1. During the cave resource inventory process, caves, their subsurface extent and the position of all significant karst features and caves shall be mapped. Care shall be taken to note subsurface drainage patterns, resurgence areas, surface drainage, and drainage basin characteristics. This information is necessary to determine the cave's ecological relation to the surface. During the inventory process, note all biological, hydrological, geological, mineralogical, paleontological, cultural, recreational, or educational or scientific resource values. These values are needed to determine the significance of the cave.
  - 2. Timber harvest, road construction, and other related management activities in the vicinity of a cave or significant karst feature or above the course of a cave, shall be designed in a way to insure protection of the cave resources.
  - 3. Surface management activities should be designed to in-no-way impede or divert surface and groundwater flow into a cave or significant karst feature.
  - 4. Retention of vegetation is required in the vicinity of a cave or significant karst feature to protect the cave's microenvironment. The extent and limits of windfirm no-harvest buffers surrounding significant karst features shall be determined on a case by case basis. Topographic breaks and vegetation patterns should be utilized during buffer design and layout. The intent of the buffer is to insure stability of the cave ecosystem, the integrity of the slopes surrounding the feature, and adequate sediment filtration between management activities and the cave resources. In some instances, when a windfirm no-harvest buffer can not be designed, it may be possible to leave all nonmerchantable timber and ground cover intact, removing the overstory by directionally falling trees away from the significant karst feature. There shall be no ground disturbing activities on slopes steeper than 30 degrees adjacent to cave entrances. An example of this would be protection of a steep sided, closed basin in which surface drainage flows into a cave system or on steep slopes immediately adjacent and up hill of a cave opening.

5. Similar buffers shall be maintained around all direct drainages into significant karst features. This includes dolines, cave collapse areas known to open into a cave's drainage system, and perennial, intermittent or ephemeral streams flowing into caves. The immediate area surrounding resurgence streams shall be protected to insure stability of the cave systems's ecosystem. The intent of this direction is to insure that additional sediment is not introduced into the cave system, surface flows are not interrupted, and logging slash and debris is not transported into the cave system or allowed to plug the cave entrance.
6. Where timber harvest is occurring in the vicinity of a cave, fall trees directionally away from the cave and its course. Yarding should in no way drag timber across and/or through significant karst features. Full suspension, lateral, and/or split yarding or other mitigation measures which will insure the stability of the karst slopes is required in these areas. Trees felled into or across significant karst features shall be not be removed. Any small woody debris that has found its way into significant karst features shall be hand removed within 48 hours.
7. No significant karst feature shall be used as disposal sites for slash, spoils, or other refuse. When designing facilities, consider the possible effects of the facility on the karst system. Carefully plan sewer facilities, waste disposal sites, fuel storage areas, and hazardous material storage sites to mitigate possible effects on significant karst features in the event of a system failure, leakage, or spill.
8. Design roads and related construction to avoid altering surface drainage into significant karst features or focusing sediment from road surface and/or drainage into significant karst features. Any excavation requiring blasting in the vicinity of a cave should be carefully designed to insure that seismic shock does not affect the fragile formations in the cave, destabilize cave passages, or alter groundwater flow into the cave. Individual shots shall be designed to minimize overshot materials so vegetation is not damaged or destroyed. Blasting plans shall be required as well as careful monitoring of all such excavation.
9. Design quarry and material sources to insure that location and excavation in no way threaten cave resources.
10. Recognize that blasting and other surface management activities can result in significant disturbance of roosting and hybernating bats within the cave systems. Some bird species utilize the cave entrances for nesting and seabird rookeries have been found in some littoral caves. Seasonal closures prohibiting construction activities in some areas may be required to insure protection of these populations.
11. Limit public access, if required, to prevent damage to the cave resources and/or if there are safety hazards.
12. Information concerning the specific location of any significant cave may not be made available to the public unless disclosure of such information would further the purposes of the Act and would not create a risk of harm, theft, or destruction of the cave.
13. Scientific or educational use of caves will be authorized by the Forest Supervisor, where appropriate.

14. Communication and cooperation between the Forest Service, caving organizations, and recreationists will be fostered. Exchanged information will not be made public if it could lead to the degradation of sensitive caves.
15. Emphasize enforcement of laws protecting caves from relic collectors and vandalism.